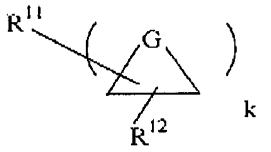
Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A two part polymerizable composition comprising in one part about 1 to about 8 percent by weight of an organoborane amine complex and about 10 to about 50 percent by weight of one or more compounds containing at least one heterocyclic ring opening moiety, and in the second part about 0.1 to about 10 percent by weight of a Lewis acid catalyst capable of initiating polymerization of the compounds containing heterocyclic ring opening functionality and compounds capable of free radical polymerization wherein the heterocyclic ring opening compounds contain moieties which correspond to the formula



Formula 12

R^{11} and R^{12} is independently in each occurrence a hydrocarbon based moiety optionally containing one or more nitrogen, oxygen, sulfur or halogen atoms; and R^{12} may optionally be hydrogen and may be bound to all possible positions on the ring not occupied by R^{11};

G represents independently in each occurrence nitrogen or sulfur; and 'k' represents separately in each occurrence an integer of from 2 to about 10.

2. (Original) A two part composition according to Claim 1 wherein the second part further contains a decomplexing agent capable of decomplexing the organoborane amine complex upon contacting the two parts.

3. (Currently Amended) A two part composition according to Claim 2 wherein G is nitrogen.

Claim 4 (cancelled).

BEST AVAILABLE COPY

Claim 5 (cancelled).

6. (Currently Amended) The two part composition according to Claim ~~5~~1 where the Lewis acid is an amine or ether complex of BF_3 or $SnCl_4$.

7. (Original) The two part composition according to Claim 6 which further comprises a di-functional compound capable of reacting with compounds containing a heterocylic ring opening moiety and compounds capable of free radical polymerization.

8. (Original) The two part composition according to Claim 7 in which the di-functional compound is present in an amount of from about 1 to about 15 percent by weight of the total composition.

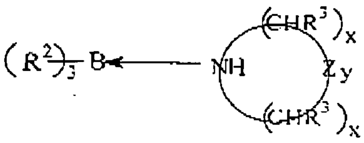
9. (Original) The two part composition according to Claim 8 wherein the organoborane amine complex comprises a trialkyl borane or an alkyl cycloalkyl borane and the amine comprises a primary amine; a secondary amine; a polyamine having primary or secondary amines or both; ammonia; polyoxyalkylene amines; the reaction product of a diamine and a difunctional compound having moieties which react with an amine, wherein the reaction product has terminal amine groups; aryl amines; heterocyclic amines; a compound having an amidine structural component; aliphatic heterocycles having at least one secondary nitrogen in the heterocyclic ring wherein the heterocyclic compound may also contain one or more additional secondary or tertiary nitrogen atoms, oxygen atoms, sulfur atoms, or double bonds in the heterocycle; alicyclic compounds having bound to the alicyclic ring one or more substituents containing an amine moiety; conjugated imines; or mixtures thereof.

10. (Original) A composition according to Claim 9 wherein the organoborane amine complex is one of the following classes:

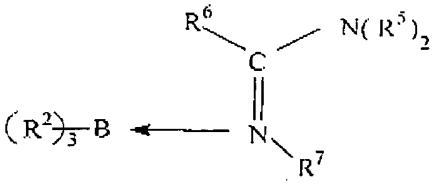
organoborane alkylamine complex corresponds to the general formula

$$(R^2)_3 B \longleftarrow NH_2(CH_2)_b(C(R^1)_2)_a X$$

the organoborane heterocyclic amine complex corresponds to the formula



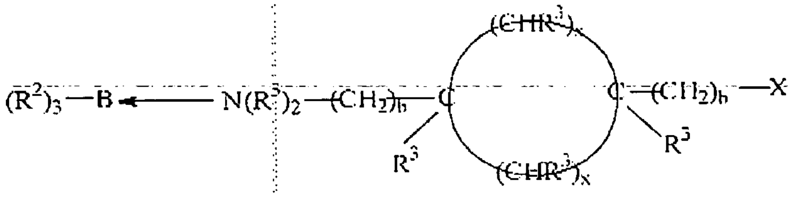
the organoborane amidine complex corresponds to the formula



the organoborane conjugated imine complex corresponds to the formula

$$(R^2)_3 B \longleftarrow NR^7 = CR^9 - (CR^9 = CR^9)_c Y$$

the organoborane alicyclic compound with an amine containing substituent corresponds to the formula



wherein B is boron;

R^1 is separately in each occurrence hydrogen, a C_{1-10} alkyl or C_{3-10} cycloalkyl;

R^2 is separately in each occurrence a C_{1-10} alkyl, C_{3-10} cycloalkyl or two or more of R^2 may combine to form a cycloaliphatic ring structure;

R^3 is separately in each occurrence hydrogen, a C_{1-10} alkyl or C_{3-10} cycloalkyl; R^4 is separately in each occurrence hydrogen, C_{1-10} alkyl, C_{3-10} cycloalkyl, C_{6-10} aryl or C_{6-10} alkaryl; R^5 is separately in each occurrence hydrogen, C_{1-10} alkyl, or C_{3-10} cycloalkyl;

R^6 is separately in each occurrence hydrogen, a C_{1-10} alkyl, C_{3-10} cycloalkyl or $-N(R^5)_2$;

R^7 is separately in each occurrence hydrogen, C_{1-10} alkyl or C_{3-10} cycloalkyl;

two or more of R^5, R^6 and R^7, in any combination, can combine to form a ring structure which can be a single ring or a multiple ring structure and the ring structure can include one or more of nitrogen, oxygen or unsaturation in the ring structure;

R^9 is independently in each occurrence hydrogen, C_{1-10} alkyl or C_{3-10} cycloalkyl, Y, $-(C(R^9)_2-(CR^9=CR^9)_c-Y$ or two or more of R^9 can combine to form a ring structure, or one or more of R^9 can form a ring structure with Y provided the electron rich group in Y is conjugated with respect to the double bond of the imine nitrogen;

X is a hydrogen-bond accepting group,;

Y is independently in each occurrence hydrogen, $-N(R^4)_2$, $-OR^4$, $-C(O)OR^4$, a halogen or an alkylene group which forms a cyclic ring with R^9;

Z is separately in each occurrence oxygen or $-NR^4$;

a is separately in each occurrence an integer of from about 1 to about 10;

b is separately in each occurrence 0 or 1, with the proviso that the sum of a and b should be from about 2 to about 10;

c is separately in each occurrence an integer of from about 1 to about 10;

x is separately in each occurrence an integer of about 1 to about 10, with the proviso that the total of all occurrences of x is from about 2 to about 10; and

y is separately in each occurrence about 0 or 1.

11. (Original) A method of polymerization comprising contacting the components of the polymerizable composition of Claim 1 under conditions such that the one or more compounds containing a heterocyclic ring opening moiety and the compounds capable of free radical polymerization undergo polymerization.

12. (Original) The method of Claim 11 wherein the contacting occurs at, or near, ambient temperature.

13. (Original) The method Claim 12 which further comprises the step of heating the composition to an elevated temperature under conditions such that the one or more compounds containing a heterocyclic ring opening may react further.

14. (Original) A method of bonding two or more substrates together which comprises:

a. contacting the components of the composition of Claim 1 together under conditions such that polymerization is initiated;

b. contacting the adhesive composition with the two or more substrates;

c. positioning the two or more substrates such that the adhesive composition is located between the two or more substrates wherein they are in contact with one another; and

d. allowing the adhesive to cure so as to bind the two or more substrates together.

15. (Original) A method of bonding two or more substrates according to Claim 14 which further comprises heating the adhesive composition to a temperature such that the one or more compounds containing a heterocyclic ring opening moiety may react further.

16. (Original) A method of modifying the surface of a low surface energy polymer by contacting a composition according to Claim 1 with at least a portion of the surface of the low surface energy polymer and causing the organoborane amine complex to disassociate thereby initiating polymerization of the monomer, oligomers, polymers or mixture thereof such that the polymer formed is on the surface of the low surface energy polymer.

17. (Original) A method of coating a substrate which comprises contacting the components of the composition of Claim 1; contacting the contacted composition with one or more surfaces of a substrate; and allowing the coating composition to cure.

18. (Original) A coating composition which comprises the composition of Claim 1.

19. (Original) A laminate comprising at least two substrates having disposed between the substrates and bound to each substrate a composition according to Claim 1.

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☐ BLACK BORDERS

☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES

☐ FADED TEXT OR DRAWING

☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING

☐ SKEWED/SLANTED IMAGES

☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS

☐ GRAY SCALE DOCUMENTS

☒ LINES OR MARKS ON ORIGINAL DOCUMENT

☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY

☐ OTHER: ______________________

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.